

What is claimed is:

1. An electric actuator system comprising:

an electric motor;

a pulse generator for generating pulse signals in accordance with rotation of said electric motor; and

means for detecting a rotation angle of a rotating shaft based on the pulse signals generated by said pulse generator, wherein

said pulse generator generates initialization pattern pulse signals as the electric motor rotates, said signals indicative of a starting point of the rotation of said electric motor, and

means for electrically controlling the rotation of said electric motor when said initialization pattern pulse signals are detected.

2. The electric actuator system according to claim 1, wherein said initialization pattern has a combination of waveforms that are different from that of a signal pattern that said rotation angle detecting means uses for detecting the rotation angle.

3. The electric actuator system according to claim 1, wherein said pulse generator generates two-phase pulse signals as the initialization pattern pulse signals and said initialization pattern includes a simultaneous change of amplitude of said two-phase pulse signals.

4. The electric actuator system according to claim 3, wherein said initialization pattern includes two or more simultaneous changes of the amplitude of said two-phase pulse signals.

5. The electric actuator system according to claim 3, said pulse generator further comprising:

means for first and second switching connected in parallel between a power source circuit and ground, said first and second switching means being individually turned on and off as the electric motor rotates, thereby generating said two-phase pulse signals.

6. The electric actuator system according to claim 5, said pulse generator further comprising:

means for common switching connected between said first and second switching means and ground.

7. The electric actuator system according to claim 6, wherein said pulse generator is configured such that said common switching means is turned on and off while said first and second switching means are maintained in an ON state, thereby generating said two-phase pulse signals from said first and second switching means.

8. The electric actuator system according to claim 3,

wherein said initialization pattern undergoes a simultaneous change of the amplitude of said two-phase pulse signals from a low level to a high level, and to the low level.

9. An electric actuator system comprising:

an electric motor;

a pulse generator for generating pulse signals in accordance with a rotation angle of said electric motor; and

means for detecting a rotation angle of a rotating shaft based on the pulse signals generated by said pulse generator, wherein

said pulse generator generates initialization pattern pulse signals as the electric motor rotates, said signals indicative of a starting point of the rotation of said electric motor, the system further comprising:

means for setting and storing an initial position, at which said initialization pattern pulse signals are detected, as a starting point, and

means for initial position re-setting and operating said initial position setting means when there is an abnormality in the pulse signals generated in accordance with the rotation angle of said electric motor.

10. The electric actuator system according to claim 9, wherein said initial position re-setting means determines that there is an abnormality in the pulse signals when there is irregularity in the waveform of said pulse signals.

11. The electric actuator system according to claim 9, wherein said initial position re-setting means determines that there is an abnormality in the pulse signals when the pulse signals stop changing while power is supplied to said electric motor.

12. The electric actuator system according to claim 11, wherein said initial position re-setting means determines whether there is an abnormality in the pulse signals after a lapse of a preset time period after the start of power supply to said electric motor.

13. The electric actuator system according to claim 11, wherein said initial position re-setting means operates said initial position setting means after starting power supply to rotate said electric motor in an opposite direction from a direction in which said electric motor is rotating immediately before the pulse signals stop changing.

14. The electric actuator system according to claim 11, wherein said initial position re-setting means operates said initial position setting means after starting power supply to rotate said electric motor in an opposite direction from a direction toward said starting point.

15. The electric actuator system according to claim 9,

wherein, when there is an abnormality in the pulse signals, said initial position re-setting means operates said initial position setting means after a lapse of a preset time period after a startup switch that allows power supply to said electric motor is turned off.

16. The electric actuator system according to claim 9, wherein, when there is an abnormality in the pulse signals, said initial position re-setting means operates said initial position setting means immediately after a startup switch that allows power supply to said electric motor is turned off.

17. The electric actuator system according to claim 9, wherein, when there is an abnormality in the pulse signals, said initial position re-setting means operates said initial position setting means immediately after occurrence of the abnormality.

18. An electric actuator system comprising:

an electric motor;

a battery power source for supplying power to said electric motor;

a pulse generator for generating pulse signals in accordance with a rotation angle of said electric motor; and

means for detecting a rotation angle of a rotating shaft based on the pulse signals generated by said pulse generator, wherein

said pulse generator generates initialization pattern pulse signals as the electric motor rotates, said signals indicative of a starting point of rotation of said electric motor, the system further comprising:

means for setting an initial position and storing a position, at which said initialization pattern pulse signals are detected, as a starting point;

a startup switch that allows power supply to said electric motor;

a memory device that can retain input information without power supply; and

means for inputting data in said memory device after said startup switch is turned off, said data indicates that the battery is connected.

19. The electric actuator system according to claim 18, wherein said memory device is an EEPROM that is rewritable with electrical processing.

20. The electric actuator system according to claim 18, further including:

means for resetting said data input to said memory device after the startup switch is turned on.

21. The electric actuator system according to claim 18, wherein said initial position setting means is operated when said data is not present in said memory device after said

startup switch is turned on.

22. An electric actuator system comprising:
an electric motor for rotating movable parts;
a pulse generator for generating pulse signals in
accordance with rotation of said electric motor; and

means for controlling a rotation angle of a rotating
shaft based on the pulse signals generated by said pulse
generator, wherein

said pulse generator generates initialization pattern
pulse signals as the electric motor rotates within a rotation
control range of said movable parts, said signals indicative
of a starting point of the rotation of said electric motor,
the system further comprising:

means for setting an initial position and stopping said
electric motor when said initialization pattern pulse signals
are detected and storing a stopped position of the electric
motor as a starting point, wherein

said control means maintains rotation of said electric
motor during its control of the rotation angle even when said
initialization pattern pulse signals are detected.

23. The electric actuator system according to claim 22,
further comprising:

means for setting flag data when it is determined to be
necessary to store said starting point, wherein, when said
flag data is set, if the initialization pattern pulse signals

are detected, said initial position setting means stops the rotation of the electric motor and stores the stopped position of the electric motor as the starting point, and when the flag data is cleared, said control means ignores said initialization pattern pulse signals and keeps said electric motor rotating.

24. The electric actuator system according to claim 22, wherein said electric motor is rotated by said initial position setting means in a direction that is determined based on detection possibility of said initialization pattern pulse signals.

25. The electric actuator system according to claim 22, wherein said electric motor is rotated by said initial position setting means in a direction that is determined based on mechanical strength at both ends of a rotation control range.

26. The electric actuator system according to claim 22, wherein said initial position setting means determines a current season and decides in which direction to move said electric motor based on the determined season.

27. The electric actuator system according to claim 26, further comprising:

an inside air temperature sensor for detecting an inside

air temperature, wherein said initial position setting means determines the season based on a detected inside air temperature.

28. The electric actuator system according to claim 26, further comprising:

an outside air temperature sensor for detecting an outside air temperature, wherein said initial position setting means determines the season based on a detected outside air temperature.

29. The electric actuator system according to claim 28, further comprising:

an inside air temperature sensor for detecting an interior air temperature, wherein said initial position setting means determines the season based on a detected interior air temperature and a detected outside air temperature.

30. An electric actuator system comprising:

an electric motor;

a pulse generator for generating pulse signals in accordance with rotation of said electric motor and initialization pattern pulse signals indicative of a starting point of the rotation of said electric motor;

a control unit for controlling a rotation angle of a rotating shaft based on the pulse signals generated by said

pulse generator;

initial position setting means for stopping said electric motor, when said initialization pattern pulse signals are detected, and storing the stopped position of the electric motor as a starting point; and

means for stopping rotation of said electric motor at a fail-safe position when it is determined that there has been a failure in detecting said initialization pattern pulse signals.

31. The electric actuator system according to claim 30, said fail-safe means further comprising:

means for turning said electric motor in a reverse direction when it determines, based on the pulse signals from said pulse generator, that said initialization pattern pulse signals are not detected during the rotation of said electric motor by said initial position setting means, and wherein said fail-safe means determines that there is a failure in detecting said initialization pattern pulse signals when the rotation of said electric motor is reversed more than a preset number of times.

32. An electric actuator system comprising:

a plurality of electric actuators each including an electric motor for rotating movable parts;

a pulse generator for generating pulse signals in accordance with rotation of said electric motor and initialization pattern pulse signals indicative of a starting

point of the rotation of said electric motor within a rotation control range of said movable parts;

a plurality of electrical control circuits each including:

means for controlling a rotation angle of a rotating shaft of each electric actuator based on the pulse signals generated by said pulse generator; and

means for setting an initial position and for stopping said electric motor, when said initialization pattern pulse signals are detected, and storing the stopped position of the electric motor as a starting point; and

an electronic control device that communicates with said plurality of electrical control circuits, wherein

said electronic control device sends flag data to the electrical control circuit of each of said electric actuators for instructing whether to operate said initial position setting means, and

when said electrical control circuit has received preset flag data from said electronic control device, said control unit of said electrical control circuit keeps said electric motor rotating and continues the control of the rotation angle of the electric motor even if said initialization pattern pulse signals are detected.

33. An electric actuator system comprising:

a plurality of electric actuators each including an electric motor for rotating movable parts, and a pulse

generator for generating pulse signals in accordance with rotation of said electric motor and initialization pattern pulse signals indicative of a starting point of the rotation of said electric motor within a rotation control range of said movable parts;

a plurality of electrical control circuits each including control means for controlling rotation angle of a rotating shaft of each electric actuator based on the pulse signals generated by said pulse generator, and initial position setting means for stopping said electric motor, when said initialization pattern pulse signals are detected, and storing the stopped position of the electric motor as a starting point; and

an electronic control device that communicates with said plurality of electrical control circuits, wherein

said electronic control device sends current position data of each electric actuator to each electrical control circuit, and

each of said plurality of electrical control circuits receives the current position data and renews the received current position data based on the pulse signals generated from said pulse generator, and operates said initial position setting means to stop the rotation of said electric motor and to store the stopped position of the electric motor as the starting point only when the renewed current position data matches a predetermined value and said initialization pattern pulse signals are detected.

34. The electric actuator system according to claim 33, each of said plurality of electric actuators comprising:

means for mechanically stopping the rotation of said electric motor at both ends of said rotation control range;

means for turning said electric motor in a reverse direction when the rotation of the electric motor is stopped by said first stop means before the detection of said initialization pattern pulse signals by said initial position setting means, and

means for stopping reverse rotation of said electric motor, during the rotation of the electric motor in the reverse direction by said reverse rotation means, at a position farther than a position where said initialization pattern pulse signals are to be detected before the electric motor is stopped by said second stop means and for receiving current position data from said electronic control unit at the stopped position, and

when said reverse rotation means rotates said electric motor in the reverse direction after said receiving means receives the current position data, if the renewed current position data matches a predetermined value and if said initialization pattern pulse signals are detected, said initial position setting means stops the rotation of said electric motor and stores the stopped position as a starting point.

35. An electric actuator system comprising:

a plurality of electric actuators each including an electric motor for rotating movable parts, and a pulse generator for generating pulse signals in accordance with rotation of said electric motor and initialization pattern pulse signals indicative of a starting point of the rotation of said electric motor within a rotation control range of said movable parts;

a plurality of electrical control circuits each including:

means for controlling a rotation angle of a rotating shaft of each electric actuator based on the pulse signals generated by said pulse generator;

means for initially setting and stopping said electric motor when said initialization pattern pulse signals are detected and storing the stopped position of the electric motor as a starting point; and

an electronic control device that communicates with said plurality of electrical control circuits, wherein

when said electronic control device determines that there is a failure in detecting said initialization pattern pulse signals in each electric actuator, it instructs said electrical control circuit of each electric actuator to stop the rotation of said electric motor so that the electric actuator stops at a fail-safe position.

36. The electric actuator system according to claim 35,

said electronic control device further comprising:

means for reversing rotation of said electric motor of said electric actuator when it determines, based on the pulse signals from said pulse generator, that said initialization pattern pulse signals are not detected during the rotation of said electric motor by said initial position setting means, wherein said electronic control device determines that there is a failure in detecting said initialization pattern pulse signals in said electric actuator when the rotation of said electric motor is reversed more than a preset number of times.